

Since our conversation on the 1st, I have talked with 11 people from EPA, NOAA, USDA, the US Global Change Research Program (USGCRP), and the National Academy of Sciences (NAS) about the idea of evaluating climate change model accuracy. I also talked with Michael Webber at UT.

I thought it best to provide you this in writing for several reasons, and apologize if it seems as though this comes across as too formal. That is not my intent. Rather, my intent is to make it easier to convey the key points, provide additional background information, and make sure that I don't overlook the many points that I heard in my discussions.

An important caveat: Although I have taken into account the perspectives of everyone I've talked with, please be aware that these are my perspectives alone, and do not represent an official EPA or federal government position. That said, I think they do indicate that there is relatively broad support for continued discussions.

Bottom line: It is premature to undertake an evaluation of climate model accuracy at this time. It may be appropriate to do so in the near future, but only if additional dialog among a broader group moves us in that direction.

Suggested first step: Hold a person-to-person dialog to freely exchange perspectives and concerns.

From nearly everyone I talked with, I heard strong support for the basic idea of an effort to improve the dialog between the scientific community and energy producers. Everyone agreed that the core issue is one of trust; as one person said, "We are all interested in building trust."

In this instance, "a person-to-person dialog" should be interpreted broadly to possibly include multiple, facilitated dialog opportunities among a broad range of people and perspectives. It is critical, though, for these discussions to be face-to-face. In the event that these dialogs determine that a model evaluation study is needed, we would have a much better understanding of the issues, scope, and potential benefits of the study and be able to design to address those issues.

Background

The scientific community has strong confidence in the basic understanding of climate change.

Everyone that I talked with pointed out that the basic scientific understanding of climate change and its drivers is correct and is accurately reflected in the major assessments by the IPCC, NAS, and USGCRP. That perspective comes from our participation in the broad and intensive development and review processes that have resulted in the assessments of the IPCC, NAS, and USGCRP. Those processes are, by far, the most rigorous that we've been involved with. There is a strong interest in ensuring that any study that might be undertaken as a consequence of our discussions will work to build trust and communication and add to, rather than undermining, the enormous existing body of research.

More specifically, that perspective about climate science in general also applies to the climate models. Those of us who have been closely involved in these processes are aware of the strengths and limitations of models, where there are disagreements and gaps in our understanding, and how the models should and should not be used. Everyone also agrees that the IPCC, NAS, and USGCRP assessments have consistently identified and discussed those issues that are not yet well understood.

There is a clear recognition that this confidence in the science is not shared by everyone who has not

been involved in the development, critiques, and evaluations that are a fundamental part of these processes. This is understandable, since most people are not aware of the work that goes into the major assessments or have the time to dig into details of the studies that address the strengths and limitations of the science.

With that as background, below are the key points that have been raised in my discussions. I am hopeful that we can work from these to form an approach that builds trustful dialog between the two communities. I will break these points into two categories – communication and science.

Communication issues

1. **The most important issue is trust, not science.** This is the primary reason for suggesting that it is premature to undertake a scientific study. It is critical to be clear that the proposed study, should it proceed, would be conducted with the primary goal of addressing the concerns of, and building a dialog with, a skeptical community. That means that it would not be the same sort of scientific evaluation that we are generally familiar with, but would require *a priori* integration of communication and trust-building components from the outset.
2. **Facilitated discussions may be appropriate prior to beginning any study.** A first step may be to facilitate a dialog between climate scientists and (in this case) those in the petroleum industry. The intent would be to discuss (among other things) how the science is conducted, how models are used, how they fit into the rest of the science, how science sees uncertainty, and differences in dialogs within the scientific community and in the media and general public. For this to be a true dialog, it would also need to provide the opportunity to voice concerns and skepticism about the models, climate science, and perceptions of bias. All of these issues would need to be raised in a venue that allows perspectives to be voiced freely and heard respectfully.
3. **There is considerable skepticism that another study would make a difference** in the broader discussion. There have been unsuccessful efforts to bridge the gaps that have often led to more rather than less antagonism. Even so, nearly everyone believes that there can be substantial value in having the dialog.
4. **The process needs to be one of consensus** if it is to be worth the time and money invested. An effort that results in a dissenting or minority report will not serve the primary purpose of the study (as seen in some of the bridging efforts noted above). The recently proposed “Red Team/Blue Team” approach¹ was seen as likely to perpetuate the perception that there are fundamental, unresolved differences in the core science, and would exacerbate rather than mitigate the lack of trust.

Scientific issues

1. **“Model accuracy” is vague** and needs to be defined if a study is to be meaningful. There are numerous model outputs, many of which are designed for research and not to inform policy discussions. Models incorporate inputs that are inherently unpredictable, such as economic activity. A study that intends to evaluate model accuracy must be carefully designed to account for these and other factors.
2. **The key question regarding models is whether they are “fit for use”** – do they adequately address the questions for which they were designed? Models that are designed to study multi-

¹ Koonin, Steven. A ‘Red Team’ Exercise Would Strengthen Climate Science, Wall Street Journal, April 20, 2017. <https://www.wsj.com/articles/a-red-team-exercise-would-strengthen-climate-science-1492728579>.

decadal, global-scale changes are limited in their ability to evaluate annual changes at a regional scale, for instance.

3. **Models are not the primary drivers of climate science.** Good models effectively represent fundamental physical processes and observed behavior. If models are to be effectively evaluated, the evaluation must be within the context of observed and documented changes and understanding of past conditions and fundamental physics.
4. **It is important to ensure any additional study is described in context** of the extensive body of science and the usual approach for undertaking a significant research effort. There is considerable concern that this effort could open the door to an endless call for more studies to address issues of concern to specific audiences, particularly when a substantial body of mature research already exists.

The challenge is to design a process that allows for open and respectful interaction, is objective and is perceived to be objective, and sets the stage for on-going dialog. Of these, the most difficult is likely to be the perception, of significantly disparate groups, of objectivity.

Discussions with Michael Webber identified several possible approaches to developing a study designed to address one or more of these concerns:

1. Conduct the study under the leadership of the University of Texas, which has a good working relationship with the petroleum industry.
2. Form a panel of qualified scientists, primarily from the academic community, to conduct the review. Scientists would be selected to ensure appropriate representation of scientific expertise and ability to effectively communicate the study results to audiences with diverse base perspectives on climate change (no single panel member would be expected to communicate with all audiences, but would provide a more trusted source for specific audiences).
3. Consider an approach that provides an opportunity for extended face-to-face contact among panel members, perhaps as much as several weeks.

Additional suggestions raised during discussions:

1. Form a steering committee composed of members with a broad range of perspectives.
2. Solicit questions from different interested parties for the panel to address. An effective study will begin with a limited set of charge questions, which could address perceived model shortcomings and strengths. The charge questions would be developed by the steering committee and include at least some of the questions received through the solicitation.
3. Consider a role for the National Academies and the US Global Change Research Program. This would strengthen the perception of the study's authoritativeness across the scientific community. There are several options that would work toward the goal of building trust and interaction. One option would be to use the NAS as the review body for the final report, and include both the Board on Earth Sciences and Resources (which covers petroleum resources and includes industry representation) and the Board on Atmospheric Sciences and Climate.